

# CHICAGO REGIONAL HOUSEHOLD TRAVEL INVENTORY

## *White Paper: Inventory Contents*

*Primary Authors:*

*Dean Englund, PB*

*Peter Vosha, PB*

*Mark Bradley, Consultant*

*Chandra Bhat, Consultant*

*Ron Eash, Consultant*

*Secondary Authors:*

*Keith Lawton, Consultant*

*Stacey Bricka, NuStats*



3006 Bee Caves Rd., Suite A-300. Austin, Texas 78746  
(512) 306-9065 . fax (512) 306-9077 . [www.nustats.com](http://www.nustats.com)

Contact: Stacey Bricka, Research Director



# TABLE OF CONTENTS

---

<b>Introduction</b>	<b>1</b>
Paper Objective	3
<b>Advanced Modeling Practice</b>	<b>4</b>
<b>Data Inventory Recommendations</b>	<b>6</b>
Data Content	6
Data Elements	7
Modeling requirements	10
Data items and model structure	11
<b>Stated Preference Recommendations</b>	<b>26</b>
Congestion pricing	27
Parking location	27
Impact of transit service quality and estimation of potential for modal shift to transit	28



# LIST OF TABLES AND FIGURES

---

Table 1: Model Applicability	5
Table 2: One-Day Survey Versus Two-Day Survey Trip Rates	7



# INTRODUCTION

---

The Chicago Regional Household Travel Inventory is a comprehensive study of the demographic and travel behavior characteristics of residents in the greater Chicago area. Sponsored by the Chicago Metropolitan Agency for Planning (CMAP) and the Illinois Department of Transportation (IDOT), the study universe is defined as households residing in the Illinois counties of Cook, DuPage, Grundy, Kane, Kendall, Lake, McHenry, and Will. The project has two phases: Design and Data Collection. The design phase took place in the fall of 2006. The full data collection effort will take place in 2007.

The purpose of the design phase of the study was to identify (through research and primary data collection) the most appropriate design and methodological aspects that maximize the quality and validity of the inventory data for modeling purposes. The three main objectives of the design phase were: (1) to validate existing budgetary assumptions regarding data collection efforts anticipated for the full study (and establish new assumptions as necessary), (2) to ensure that the inventory design elements and methods provide for a data set that supports the development of a valid model, and (3) to vet the inventory design recommendations through a series of white papers, supported by both primary and secondary research, using a peer review panel of both topical and regional experts. This document is one of the four white papers developed as part of the study's design phase.

The purpose of the white papers prepared under this design phase is to address specific issues pertaining to the design of the data inventory and supporting data collection effort. Because the data will be used to both update the current regional travel demand model as well as for developing new models, the actual elements contained in the inventory need to meet the needs of both efforts. These white papers serve to delineate those elements that are critical to both efforts. Ultimately, the cost trade-offs, respondent reactions, white paper recommendations, and input from the expert and local peer review panels will be used by CMAP staff to finalize the actual inventory contents.

Each white paper has a primary author team and a secondary author. The primary author team was responsible for ensuring that the document addressed the necessary elements and provided actionable recommendations for the data collection phase. To facilitate this, the primary authors provided the project manager with a list of key questions or design elements for the pilot test (these are discussed below). The secondary author's role was as reviewer, with the specific intent being to balance the paper, to ensure that it was well-rounded and practical in approach and recommendations.

The white papers combine secondary research with primary data collection (through the study pilot) in order to make recommendations on key issues that impact inventory design. These issues were identified at the project kick-off meeting<sup>1</sup>, held Tuesday, May 23, 2006 in Austin, Texas and include: (1) inventory content, (2) sampling considerations, (3) maximizing participation, and (4) efficient data collection. Each of these is discussed in a separate document. This paper focuses on the inventory contents. The inventory must contain accurate depictions of the demographic and travel behavior characteristics of regional residents. Achieving this straightforward objective requires consideration of several issues related to the inventory design. These include:

---

<sup>1</sup> This kick-off meeting included the project team members as well as members of the project's expert and peer review panels.

- Data Contents – What type of behavioral documentation is desired to support the study objectives?
  - Weekday and weekend travel?
  - Continuous data or stop for summer/holidays?
  - Survey period – 24 hours? 48 hours? Weeklong? Mix? (if mix, how?)
  - Complete travel/activity records for all HH members?
  - 100% geocoding?
- Data Elements – What data should be in the inventory?
  - In-home activities and substitution effects (internet connectivity, usage)
  - Decisions/decision making
  - Do they consider transit an option?
  - Cost of parking, where parked, perception of parking if didn't drive
  - Effect of transit fares, Transit routes used (How did they route themselves through the transit system?) Impact of service reliability
  - Route choice (toll vs. non-tolled facilities) – which chose and why?
  - Stated preference – sensitivity to time of day strategies
  - Pre and post surveys
  - Residential and workplace changes
  - Value of time for individuals and if vary by trip purpose
  - Attitudes/market segmentation
- Modeling Requirements
  - Represent sub-modes in model? (transit = buses, rail, commuter rail, etc.)
  - Expansion?
  - Activity-based?
  - Links to current model?
  - Land-use elements?
  - Availability and quality of GIS coverage files (comprehensive files of highway system and routes by type, precise distance to stops)
  - What level of geocoding is necessary to support the modeling effort?
- What considerations should be given to the needs of other potential users of the data – FTA new starts, public health – built environment/physical activities, etc.?

The main questions evaluated through the survey pilot effort focused on the trade-offs between the additional detail desired to support more robust tour or activity based models and the resulting impact of that additional detail on respondents, reflected through response rates and level of detail provided by respondents. To accomplish this, the pilot tested the following elements:

- What are the effects on response rates and trip reporting in asking respondents to complete a one-day vs. a two-day travel log? How do the details from a multi-day collection effort strengthen model validity?
- What are the effects on response rates and trip reporting in asking respondents to complete a one-day log that is place-based vs. an activity-based log? How do these questions strengthen model validity?
- What are the effects on response rates and trip reporting in asking respondents to answer detailed process-oriented questions? How do these questions strengthen model validity?
- What are the benefits of eliciting more detail regarding work arrangements during the recruitment interview? How do these questions strengthen model validity?
- Can travel time reporting be improved?

## **PAPER OBJECTIVE**

In an ideal world a firm recommendation about data contents for the Chicago Metropolitan Agency for Planning proposed travel inventory would be associated with a particular travel model structure. Our instructions were to ensure sufficient data would be available for updating the current travel model set and to include the most useful data elements for developing an advanced practice travel model. Final bounds will be set by the available budget. This paper begins by highlighting the practical benefits associated with and current status of several advanced travel models (two specific papers are referenced). It goes on to summarize the discussion, reviews and collective experience of the team members about specific travel inventory data collection elements identified at the outset of this project. Next a series of tables relating individual pilot data elements to a range of model structures is presented. Finally, several stated preference topics are outlined in some detail.



# ADVANCED MODELING PRACTICE

---

Travel demand modeling today is undergoing a transition from the conventional 4-step models to a new generation of advanced activity-based models. This new generation of travel models is characterized by such distinctive features as using tours instead of trips for the base unit of travel, generation of travel in the framework of daily activity agendas of individuals, and using fully disaggregate micro-simulation techniques instead of aggregate zonal calculations. Planning agencies in Portland, San Francisco, New York, Columbus, Atlanta, Sacramento, and Denver have implemented or recently designed advanced practice model systems in the same “family” of activity-based models. The recent paper “A Summary of Design Features of Activity-Based Microsimulation for U.S. MPOs” by Bradley and Bowman summarizes the important design features of these various activity-based model systems.

The theoretical advantages of activity-based models, in particular, behavioral realism and consistency across all travel dimensions are well known and accepted by the research community and model developers. Alternatively, the practical advantages of these advanced practices in the context of planning decisions have rarely been discussed and are not as widely known. Real world applications include San Francisco for a major highway investment study and new LRT line study, in New York for air quality (conformity) analysis and congestion pricing, in Montreal for a large-scale toll road traffic and revenue study, and in Columbus for a new LRT line study. In San Francisco and Columbus, activity-based models were used for the user-benefit analysis required by FTA for “New Starts”.

In “Advanced Activity-Based Models in a Context of Planning Decisions” Vovsha and Bradley summarize the relative strengths and advanced features of activity-based models for various practical planning questions and policies compared to 4-step models. The planning questions and policies addressed include congestion pricing schemes, high-occupancy-vehicle facilities, parking policy, effect of transit fare changes, testing impacts of demographic scenarios, implications of a shorter work day, etc. They show that activity-based models are capable of treating these planning and policy issues at the level where 4-step models become very limited. Thus, moving activity-based models into practice represents the most important direction for improving travel demand models.

The table below summarizes model applicability for major planning needs and applications by model type.

**TABLE 1: MODEL APPLICABILITY**

Planning issue	Travel model type			
	Trip-based 4-step	Trip-based 4-step with population synthesis and daily activity pattern	Tour-based with simplified activity generation and scheduling	Activity-based
Highway infrastructure projects	Appropriate	Appropriate	Appropriate	Appropriate
Transit infrastructure projects (FTA New Starts)	Appropriate	Appropriate	Appropriate	Appropriate
Road pricing	Limited	Limited	Somewhat appropriate	Appropriate
HOV/HOT lanes	Limited	Limited	Limited	Appropriate
Parking policy	Limited	Limited	Limited	Appropriate
Transit fare policy	Limited	Limited	Somewhat appropriate	Appropriate
Regional conformity and impact of long-term demographic changes	Limited	Appropriate	Appropriate	Appropriate
Specific trends and policies associated with labor force participation, compressed or shorter workdays	Non appropriate	Limited	Limited	Appropriate
Impact on land-use	Limited	Limited	Limited	Appropriate



# DATA INVENTORY RECOMMENDATIONS

---

The following comprise the author team's discussion regarding the data content issues, as well as their recommendations for the Chicago Regional Household Travel Inventory.

## DATA CONTENT

### 1) Weekday and weekend travel

Collecting enough weekend travel information to support development of a separate weekend travel model was felt to be beyond the resources available. In some surveys there are proportional sub-samples of households surveyed on weekends but they are normally not used in model development. The main use of such data would be in understanding weekend travel patterns in the region (even if there is no full model), and it would also make the data set much more useful for analyzing health- and lifestyle-related policies. All team members agreed weekday travel was most important, but several team members suggested collecting weekend travel from a subset of the sample households.

### 2) Continuous data or stop for summer/holidays – **collect continuous data**

The principal goal for modeling is an average annual weekday so including seasonality, holidays, special events, etc. is most appropriate.

### 3) Complete travel/activity records for all HH members – **yes, critically important**

It is vital to the ultimate usefulness of this data inventory for model development that the information gathered be as complete as possible for all trips made. However, a simpler proxy diary for all children under, say, age 12 will help to keep large family households in the sample.

### 4) 100% geocoding – **yes, all locations need to be geographically identified**

Peter Vovsha's initial response appropriately set the stage for why 100% geocoding is absolutely necessary. "Missing/unknown location is one of the major problems with surveys. It essentially reduces the sample size since trip records with incomplete destinations are simply not usable for most of the models." This is an area where the CMAP staff can really help given their extensive local knowledge. Data items in the pilot for work and school location were very complete, which is a necessary antecedent to geocoding. The pilot did not include location information for other places. How well respondents did in providing geocodable new places locations needs to be determined.

### 5) Length of survey period

An analysis of average daily trip rates for the one and two day pilot household samples (table below) showed that those reporting for two days had a notably lower rate. This is evidence of the day two reporting fatigue factor that was anticipated. Several team members felt that while there were problems with multi-day data collection there were also offsets. For example, the 2-day travel diary results in a lower cost per diary day obtained. One team member cited experience with additional processing steps could be applied to compensate for the fall off in trip reporting on the second day. It was also suggested that collecting an entire week's travel from 10% of sampled households would greatly improve the understanding of variability in activities from day to day. There was agreement this was a lower priority than many other areas and that it would be useful to



hear from the maximizing participation and efficient data collection areas about solutions for the day 2 reporting fatigue problem.

**TABLE 2: ONE-DAY SURVEY VERSUS TWO-DAY SURVEY TRIP RATES**

	Number of Persons				
	One-Day	Two-Day			
Workers	74	36			
Non-Worker	42	30			

  

	Number of Trips Reported			
	One-Day	Two-Day		
		Total	Day 1	Day 2
Workers	305	272	146	126
Non-Worker	189	199	104	94

  

	Average Trip Rate			
	One-Day	Two-Day		
		Total	Day 1	Day 2
Workers	4.1	7.6	4.1	3.5
Non-Worker	4.5	6.6	3.5	3.1

## DATA ELEMENTS

To a large extent issues about specific data elements are linked to model structure. In the detailed tables that follow recommendations about specific items are categorized by travel model structure options that range from updating the current model set to an advanced practice fully integrated activity-based transportation and land use model. The points that follow address the general issues posed at the outset of this project.

### 1) In home activities and substitution effects – **collect minimal information**

The recommendation is to acquire complete information on where activity is taking place, but not specific activity types like watching TV at home, attending a meeting at work, etc. Only if CATS/CMAP is interested in developing an advanced activity-based model are these types of questions relevant. It is suggested that the list of activities be refined to focus on work at home, use of ICT devices and at home activities that substitute for travel.

### 2) Decisions/decision making

Development of activity-based tour models would require this type of information. To this end information on work and school time/location flexibility, tele-working, and location/time/mode flexibility are needed. Other activities are also very important to tour-based models so questions in this category should be asked of at least a subset of the sample households.

### 3) Consider transit as an option

Two questions get at this point. (1) Other types of modes used to travel to this place. (2) Availability of an automobile when you chose to make this trip by bus or train. The question asking about whether other modes have ever been used to a particular destination in the past has the advantage of being specific and avoids vague responses, but it may not be relevant or informative for many trips. While not having a clear role in modeling, some team members felt understanding when transit was considered an option had enough value to justify asking this question of at least a subset of the sample households.

### 4) Parking related information – **include**

These data relate to CATS parking submodel and so are directly useful. This submodel is for central area parking and so it is very important there are enough drive to central area work trips included in the inventory database. This model requires distance walked to/from parking. Whether this distance should be calculated from specific parking locations (geocoded) or asked directly (blocks, minutes, etc.) needs to be settled. Questions about parking for those who don't drive have proved problematic and not very useful in the past and so are not recommended to be included.

### 5) Transit fare – **enhance**

Detailed information on the cost of transit travel is important to the CATS mode choice and pre-distribution model steps. Many of the responses to this question are other, which is not useful in model calibration. The fare options listed do not correspond to the fare media used on CTA, PACE or METRA, and do not allow for multiple fares. Need to explicitly identify CTA and PACE fare cards, CTA and PACE monthly and other types of passes, and METRA ten ride tickets. Specific recommendations for improving this aspect of the data collection process will be supplied. Main issue is with the reporting of fares. Too many of the responses to this question are other.

### 6) Transit routes used – **include**

While this information is not directly used in model updating or extending, it can be very helpful when checking how well various parts of the model set reflect at least a minimal set of real world cases and so should be included. Note there were no questions related to effect of transit fares or impact of service reliability in the pilot and these areas are not recommended for inclusion.

### 7) Transit reliability –

Questions on actual and expected range of wait time could be useful, but should be asked only for the usual workplace or school. Service reliability is a difficult topic to include in a couple of short questions so without a specific purpose in mind it is a low priority.

### 8) Drive route choice – **add**

Peter Vovsha originally recommended testing response in this area, but there was no question in the pilot about driving route or whether a toll was paid. We recommend asking if the route driven used a main freeway/expressway/interstate, and if so, which one, and amount of any toll payment. This is information that is not typically collected, but may be very useful for some types of analysis. It could be informative to also know method of payment (cash or IPASS), but it is unlikely to be useful for model update or extension.

9) Started preference – **reserve for future data collection efforts**

Stated preference surveys should be undertaken if there is a very specific purpose. A number of possible SP topics are discussed in a separate section below. If there is no SP topic worth including at the present time, another option is to ask all respondents if they are willing to be contacted for a future survey, and then use the sample as a resource to get a targeted sample for a later study—e.g. a mode choice survey of households living in a potential transit corridor.

10) Residential and workplace changes

This type of information would be useful if land use modeling was anticipated. It is essential for integrated land-use & transportation models as well as some components of activity-based model. It is of limited use, however, for conventional 4-step models. There has been no suggestion of wanting to pursue this aspect of regional modeling. Some team members recommend collecting this type of information from a subset of sample households because of the insights it could provide. While others felt these questions significantly extend the recruitment data collection time and might be perceived as intrusive, so should not be included.

11) `Value of time – **do not include**

The only way to measure this would be with some sort of SP experiment. There is enough known about value of time from other studies that it should not be a top priority in this data collection effort.

12) Attitudes/perceptions

These types of questions relate to mode choice and/or destination choice in advanced practice models. Location perceptions may be used to impute missing geocodes. For these reasons several team members recommended that this data be collected at least for a subset of the sample households. There may be a good reason to do a follow-on survey at some later date when a particular client (e.g. the transit authority) is fully involved in designing the study.

13) Market segmentation – **include with revision**

There is adequate data (variable SOCCU) in the short interview to expand the work trip type to white and blue collar employment. The detailed employment descriptions in the long personal interview (variables OCCUP and OCCU1- OCCU7) are probably excessive for this purpose. No data was collected on salaries or the relative contributions of workers in multiple worker households. As a result, work trips cannot be tabulated by salary level. They may however be disaggregated by part/full-time work status. A decision about whether to segment work trips by employment type or income level will guide revision of this question.

14) Disability – **include**

The pilot questions appeared to work well, but recommendations for refinement will be provided. This type of information will be expected given the aging population and could be used in conjunction with modest extensions to the current trip generation.

15) Usual work/school location and travel mode

Several team members recommended asking this information of all workers. The question should be consistent with what was asked in the 2000 census so results can be directly compared to the 2000 CTPP.

## 16) Usual work schedule

Information about work schedules was worth acquiring in the opinion of some team members, but there was no consensus on how much detail to gather.

## MODELING REQUIREMENTS

### 1) Represent submodes in model – **yes**

The breakdown in the pilot (e.g., TBUS) is adequate and should be retained. We recommend adding including Pace vanpools and Pace paratransit type service.

### 2) Place-based versus activity-based – **modified place-based**

The place-based approach appears to have worked better in the pilot, in terms of response rate, completion time, and respondent feedback. Most of the recent regional household travel surveys have been place-based, and the format has worked out well for modeling and analysis. Thus, using the place-based format seems to be both safer and superior.

### 3) Trip purposes – **require major modification**

Whether called activity types or trip purposes there are many changes needed in this area. The trip purposes (variable TPURPO) in the pilot are not consistent with the trip generation trip categories in the current trip generation model. The trip data could not be sorted into shop and other trip categories because shopping and some service trip purposes are lumped into the category of household errands. Major retail purchases are also not separated from everyday household subsistence shopping, which precludes further subdivision of the shopping trip purpose.

### 4) Employment categories – **make consistent with regional socioeconomic file**

In updating the current CATS model set much needs to be done for re-estimating the equations for non-home trip ends. It is therefore very important that the employment categories in database are consistent with employment categories in regional socioeconomic file, as well as comparable to those in census.

### 5) Household structure – **add**

While recognizing client direction that seeking data on relationships among household members can be perceived as intrusive, it is still true that this type of information is important to the CATS trip generation model. We recommend adding a question to the recruitment instrument, matching the census, as to whether the household is a family or not.

### 6) Household vehicles - **include**

The detailed household characteristics in pilot are directly useful in recalibrating the household vehicle ownership model. The vehicle make, model and year information collected in the pilot will be useful for updating this part of CATS current model set.

### 7) Group quarters trip data

Workers and non-workers in group quarters have the same trip rate as single person, childless, non-vehicle owning workers and non-workers, respectively, in the current CATS trip generation model. According to the 2000 Census there were about 44,000 individuals in college housing and about 10,500 military (primarily Great Lakes and Fort Sheridan) in the region. Some team members

suggested investigating whether transportation faculty at UIC and Northwestern would be willing to assist with on campus interviews. While usually treated as a separate population segment, addressing them now would better fit with updating the current model.

#### 8) 2000 Census data

The existing CATS trip generation model uses tables from the 1990 CTPP to disaggregate zone level forecast households by number of adults, number of workers, number of children and income quartile. These tables will need to be revised as part of updating the current model set. It is important that information from the data inventory be consistent with 2000 Census and ACS.

### DATA ITEMS AND MODEL STRUCTURE

The decision on inclusion/exclusion of data items should be made based upon the future model structure desired. Possible model structures can be classified in the following way (from the simplest to most advanced):

- **Update Current Model** — Update parameters and coefficients in the current regional trip-based 4-step model.
- **Extend Model** — Make modest extensions to the current regional trip-base 4-step model; e.g., stratify work trip types in trip generation and trip distribution, use family/non-family household types as part of household structure in trip generation, reflect travel limitations due to disability in trip generation, etc.
- **4Step+DAP** — Trip-based model of trip distribution and mode choice with the first step (trip generation) replaced with the daily activity pattern model. This model also assumes population synthesis procedure to support the individual daily pattern. This model allows for better segmentation and accounting for structural changes in population composition with respect to travel generation.
- **Tour** — Tour-based model with simplified activity generation & scheduling “engine” (similar to the existing models in San-Francisco County and New York and new models being developed in Denver and Sacramento)
- **AB** — Activity-based tour-based model (similar to the existing model in Columbus and models being developed in Atlanta and San Francisco Bay Area)
- **AB+LU** — Integrated activity-based transportation and land-use model.

The tables below are based upon the pilot data dictionary. In addition to recommendations for data items corresponding to the above model structures, question numbers relating data fields to retrieval instruments are also included. The source of items marked DP indicates they are the result of data processing; e.g., assigned person number. Question numbers with \_FU appended indicate nonspecific responses typically for the other category. Additional, suggested new data items have been added at the end of some tables. Entries in the column marked “Planning Info” represent information that might not be necessary for model related work, but is still recommended to be included in the data inventory.

## Household Table Data

Field	Description	Recruit	Retrieve	Q#/source	Current CATS	Extend CATS	Planning Info	4Step +DAP	Tour	AB	AB+LU
SAMPN	Sample Number (unique identifier)	X		DP	X	X		X	X	X	X
HHADDR	Household address	X		D3	X	X		X	X	X	X
GROUP	Travel Group	X		DP	X	X					
AREA	Location of HH	X		DP	X	X					
SLONG	Long or short interview	X		DP/D0	NA						
RIBUS	Someone in HH uses transit at least once a week (reported in recruitment)	X		S5							
WABIK	Someone in HH walks/bikes to work/school at least once a week (reported in recruitment)	X		S6							
ATCOL	Someone in HH attends college/univ at least once a week (reported in recruitment)	X		S7							
HHVEH	HH Vehicles	X		V1	X	X		X	X	X	X
HHSIZ	HH Size	X		H1	X	X		X	X	X	X
PDEPN	# Travel Dependents in HH	X		DP		X		X	X	X	X
BIKES	Number of bicycles	X		H2			X	X	X	X	X
RESTY	Residence Type	X		H3		X		X	X	X	X
OWN	Owner Status	X		H4						X	X
O_OWN	Other Owner Status	X		H4_FU						X	X
HLIVE	Length of stay at current location	X		H5							X
BFCIT	Last residence - city (if HLIVE<3)	X		H6							X
BFSTA	Last residence - state (if HLIVE<3)	X		H6							X
BFZIP	Last residence - zip (if HLIVE<3)	X		H6							X
BFHOM	LONG: Last residence type (if HLIVE<3)	X		H7							X
BFOWN	LONG: Last owner status (if HLIVE<3)	X		H8							X
LHFRA	LONG: Reason for moving: Number of persons in hh increased	X		H9							X
LHFRB	LONG: Reason for moving: Number of persons in hh decreased	X		H9							X
LHFRC	LONG: Reason for moving: Number of workers in hh increased	X		H9							X

Field	Description	Recruit	Retrieve	Q#/source	Current CATS	Extend CATS	Planning Info	4Step +DAP	Tour	AB	AB+LU
LHFRD	LONG: Reason for moving: Number of workers in hh decreased	X		H9							X
LHFRE	LONG: Reason for moving: Workplace of a current worker changed	X		H9							X
LHFRF	LONG: Reason for moving: Current worker could work at home FT or PT	X		H9							X
LHFRG	LONG: Reason for moving: Number of hh vehicles increased	X		H9							X
LHFRH	LONG: Reason for moving: Number of hh vehicles decreased	X		H9							X
LHFRI	LONG: Reason for moving: Household's income increased	X		H9							X
LHFRJ	LONG: Reason for moving: Household's income decreased	X		H9							X
MNRES1	Reason for selecting Current home	X		H10							X
MNRES2	Reason for selecting Current home (multiple response)	X		H10							X
MNRES3	Reason for selecting Current home (multiple response)	X		H10							X
MNRES4	Reason for selecting Current home (multiple response)	X		H10							X
MNRES5	Reason for selecting Current home (multiple response)	X		H10							X
MNRES6	Reason for selecting Current home (multiple response)	X		H10							X
MNRES7	Reason for selecting Current home (multiple response)	X		H10							X
O_MNRES	Reason for selecting Current home other	X		H10							X
IMLOC	Most important factor for this location (if multiple responses selected)	X		H11							X
CPLNS	Number of cell phones	X		H12							
PHLNS	Number of landline phone numbers	X		H13							
FXLNS	Number of landline phone lines dedicated to fax (IF PHLNS>1)	X		H14							
NOPHN	Without phone service in past 12 months?	X		H15							

Field	Description	Recruit	Retrieve	Q#/source	Current CATS	Extend CATS	Planning Info	4Step +DAP	Tour	AB	AB+LU
LENGH	Time with no phone service (IF NOPHN=1)	X		H16							
DYHVA	Do you have.....Answering Machine/Voice Mail system	X		H17							
HOFSA	How often use answering machine to screen calls (IF DYHVA=1)	X		H17							
DYHVB	Do you have.....Caller ID	X		H17							
HOFSB	How often use caller id to screen calls (IF DYHVB=1)	X		H17							
DYHVC	Do you have.....Call blocking/Privacy manager	X		H17							
HOFSC	Often use call blocking	X		H17							
DINTA1	Location of Internet access	X		H18							
DINTA2	Location of Internet access (multiple response)	X		H18							
DINTA3	Location of Internet access (multiple response)	X		H18							
DINTA4	Location of Internet access (multiple response)	X		H18							
O_DINTA	Location of internet access other	X		H18							
TYINT	Type of Internet access	X		H18							
O_TYINT	Type of Internet access other	X		H19							
INCOM	HH Income	X		H20	X	X		X	X	X	X
ASSN	Travel Assn day (if 2-day HH, this is Day 1)	X		DP	NA						
DAY	Day of week	X		DP			X	X	X	X	X
HHDEL	# HH deliveries on Travel Day (from retrieval data)		X	C1							
SERV	# HH service calls on Travel Day (from retrieval data)		X	C2							
USLOG	Pilot Debrief Q (asked of main respondent) - Did you use your log on the travel day?	X			NA						
WHEN	Pilot Debrief Q (asked of main respondent) - How used log?	X			NA						



Field	Description	Recruit	Retrieve	Q#/source	Current CATS	Extend CATS	Planning Info	4Step +DAP	Tour	AB	AB+LU
WHYPS	Pilot Debrief Q (asked of main respondent) - Why participate	X			NA						
O_WHYPS	Pilot Debrief Q (asked of main respondent) - Other reasons why participate	X			NA						
EXPLN	Pilot Debrief Q (asked of main respondent) - Properly explain task?	X			NA						
O_EXPLN	Pilot Debrief Q (asked of main respondent) - verbatim on properly explain task?	X			NA						
MIMPO	Pilot Debrief Q (asked of main respondent) - What to convey?	X			NA						
O_MIMPO	Pilot Debrief Q (asked of main respondent) - verbatim on what to convey	X			NA						
BWINF	Pilot Debrief Q (asked of main respondent) - How to best publicize survey?	X			NA						
O_BWINF	Pilot Debrief Q (asked of main respondent) - verbatim on how to best publicize survey	X			NA						
HOWRC	Pilot Debrief Q (asked of main respondent) - Same source to record times?	X			NA						
RECTM	Pilot Debrief Q (asked of main respondent) - How record time?	X			NA						
CMPART	Survey status (complete or partial)	X		DP	NA						
ACTCOUNT	# Daily Activities		X	DP	X	X		X	X	X	X
DAY1TRIP	# Day 1 Trips		X	DP	X	X		X	X	X	X
DAY2TRIP	# Day 2 Trips		X	DP	X	X		X	X	X	X
<b>Additions:</b>											
HPARK	Parking space available at home	X		H101		X		X	X	X	X
HOFFICE	Office / equipment at home	X		H102						X	X
HFAMILY	Family or non-family household	X		H103	X	X		X	X	X	X
HMAIN	Main breadwinner in the household	X		H104		X				X	X

## Person Table Data

Field	Description	Recruit	Retrieve	Q#/source	Current CATS	Extend CATS	Planning Info	4Step +DAP	Tour	AB	AB+LU
SAMPN	Sample Number (unique identifier)	X		DP	X	X		X	X	X	X
PERNO	Person Number (unique identifier within household)	X		DP	X	X		X	X	X	X
SLONG	Short or long Interview?	X		DP	NA						
WADD	Work address (unique identifier to location file)	X		DP/W5	X	X		X	X	X	X
SADD	School address (unique identifier to location file)	X		DP/C6	X	X		X	X	X	X
GENDER	Gender	X		P1			X	X	X	X	X
AGE	Age	X		P2	X	X		X	X	X	X
AGE16	Age above or below 16	X		P3	X	X		X	X	X	X
HISP	Hispanic Origin (main respondent only)	X		P4			X	X	X	X	X
RACE	Race	X		P5			X	X	X	X	X
O_RACE	Race, OTHER	X		P5_FU			X	X	X	X	X
DISAB	Disabled	X		P6		X		X	X	X	X
DTYPE	Type of disability (IF DISAB=1)	X		P7		X		X	X	X	X
O_DTYPE	Type of disability, other	X		P7_FU		X		X	X	X	X
TWEXT	Extent of disability (IF DISAB=1)	X		P7a		X		X	X	X	X
DSLIC	Disability license (IF DISAB=1)	X				X		X	X	X	X
LIC	Licensed Driver (age 16+)	X		P8		X		X	X	X	X
EMPLY	Employed (age 16+)	X		P9	X	X		X	X	X	X
VOLUN	Volunteer (age 16+ and EMPLY>2)	X		P10	X	X		X	X	X	X
WORKS	Works (computed based on EMPLY and VOLUN for age 16+)	X		DP	X	X		X	X	X	X
WKSTAT	Status (If WORKS=2 and age 16+)	X		P11	X	X		X	X	X	X
PTRVA	Travel other than exercise: bike (age 4+)	X		P12a							

Field	Description	Recruit	Retrieve	Q#/source	Current CATS	Extend CATS	Planning Info	4Step +DAP	Tour	AB	AB+LU
PTRVB	Travel other than exercise: walking (age 4+)	X		P12b							
PTRVC	Travel other than exercise: transit (age 16+)	X		P12c							
JOBS	Number of jobs (WORKS=1)	X		W1	X	X		X	X	X	X
SOCCU	Occupation (SLONG=1 and WORKS=1)	X		W2		X		X	X	X	X
O_SOCCU	Occupation other	X		W2_FU		X		X	X	X	X
OCCUP	Occupation-LONG (SLONG=2 and WORKS=1)	X		W3				X	X	X	X
O_OCCUP	Other, Occupation-LONG	X		W3_FU				X	X	X	X
OCCU2	Management Occupation (If OCCUP=1)	X		W3_FU						X	X
O_OCCU2	Other, Manufacturing Occupation	X		W3_FU						X	X
OCCU3	Technical or Professional (if OCCUP=2)	X		W3_FU						X	X
O_OCCU3	Other, Technical or Professional	X		W3_FU						X	X
OCCU4	Legal, social service, healthcare (if OCCUP=3)	X		W3_FU						X	X
OCCU5	Education or arts (If OCCUP=4)	X		W3_FU						X	X
O_OCCU5	Other, Education or arts	X		W3_FU						X	X
OCCU6	Services (If OCCUP=7)	X		W3_FU						X	X
O_OCCU6	Other, services	X		W3_FU						X	X
OCCU7	Industrial (If OCCUP=8)	X		W3_FU						X	X
O_OCCU7	Other, Industrial	X		W3_FU						X	X
WLOC	Work Location	X		W5	X	X		X	X	X	X
IF WLOC>1		X			NA						
WNAME	Work name	X		W5_FU	X	X		X	X	X	X
WADDR	Work address	X		W5_FU	X	X		X	X	X	X
WCITY	Work city	X		W5_FU	X	X		X	X	X	X
WCNTY	Work County	X		W5_FU	X	X		X	X	X	X
WSTATE	Work State	X		W5_FU	X	X		X	X	X	X

Field	Description	Recruit	Retrieve	Q#/source	Current CATS	Extend CATS	Planning Info	4Step +DAP	Tour	AB	AB+LU
WZIP	Work Zip	X		W5_FU	X	X		X	X	X	X
WXSTR	Work Cross Street	X		W5_FU	X	X		X	X	X	X
WLAND	Work Landmark	X		W5_FU	X	X		X	X	X	X
WDAYS	Days worked	X		W6	X	X		X	X	X	X
WMODE	Typical Mode to Work	X		W7			X	X	X	X	X
O_WMODE	Typical Mode to Work, other	X		W7_FU			X	X	X	X	X
PERVH	Required to have Personal vehicle at work	X		W8			X	X	X	X	X
TELEW	Telecommute (LONG interview)	X		W9			X			X	X
WHOME	Work from home (if TELEW=1 and LONG interview)	X		W10			X			X	X
SCHED	Work schedule (LONG)	X		W11			X	X	X	X	X
LTNA1	Arrival at work: Before 6am (LONG)	X		W12				X	X	X	X
LTNA2	Arrival at work: Between 6 and 6:30am (LONG)	X		W12				X	X	X	X
LTNA3	Arrival at work: Between 6:30 and 7am (LONG)	X		W12				X	X	X	X
LTNA4	Arrival at work: Between 7am and 7:30am (LONG)	X		W12				X	X	X	X
LTNA5	Arrival at work: Between 7:30 and 8am (LONG)	X		W12				X	X	X	X
LTNA6	Arrival at work: Between 8 and 8:30am (LONG)	X		W12				X	X	X	X
LTNA7	Arrival at work: Between 8:30 and 9am (LONG)	X		W12				X	X	X	X
LTNA8	Arrival at work: After 9am (LONG)	X		W12				X	X	X	X
LTNP1	Departure from work: Before 3:30pm (LONG)	X		W13				X	X	X	X
LTNP2	Departure from work: Between 3:30 and 4pm (LONG)	X		W13				X	X	X	X

Field	Description	Recruit	Retrieve	Q#/source	Current CATS	Extend CATS	Planning Info	4Step +DAP	Tour	AB	AB+LU
LTNP3	Departure from work: Between 4 and 4:30pm (LONG)	X		W13				X	X	X	X
LTNP4	Departure from work: Between 4:30 and 5pm (LONG)	X		W13				X	X	X	X
LTNP5	Departure from work: Between 5 and 5:30pm (LONG)	X		W13				X	X	X	X
LTNP6	Departure from work: Between 5:30 and 6pm (LONG)	X		W13				X	X	X	X
LTNP7	Departure from work: Between 6 and 6:30pm (LONG)	X		W13				X	X	X	X
LTNP8	Departure from work: After 6:30pm (LONG)	X		W13				X	X	X	X
DCONG	Avoid traffic congestions (LONG)	X		W14				X	X	X	X
CMPWW	Compressed work week (LONG)	X		W15			X	X	X	X	X
LNGEM	Years at location	X		W16							X
WBCITY	Prior Work city [Ingem<3]	X		W17							X
WBSTA	Prior Work state [Ingem<3]	X		W17							X
WBZIP	Prior Work zip [Ingem<3]	X		W17							X
REASN	Primary reason for changing jobs (LONG)	X		W18							X
O_REASN	Primary reason for moving, other	X		W18_FU							X
CHGJB	Why Changed jobs	X		DP							X
O_CHGJB	Changed jobs VERBATIM	X		W19							X
FACTO1	Factor for changing jobs	X		W20							X
FACTO2	Factor for moving (multiple response)	X		W20							X
FACTO3	Factor for moving (multiple response)	X		W20							X

Field	Description	Recruit	Retrieve	Q#/source	Current CATS	Extend CATS	Planning Info	4Step +DAP	Tour	AB	AB+LU
FACTO4	Factor for moving (multiple response)	X		W20							X
FACTO5	Factor for moving (multiple response)	X		W20							X
O_FACTO	Factor for moving, other	X		W20							X
EDUCA	Education attained	X		C1				X	X	X	X
STUD	Student	X		C2	X	X		X	X	X	X
SCHOL	Level of School (if STUD<3)	X		C3			X	X	X	X	X
O_SCHOL	Level of School, other	X		C3_FU			X	X	X	X	X
SLOC	School location	X		C4	X	X		X	X	X	X
SNAME	School name	X		C5	X	X		X	X	X	X
SADDR	School address	X		C6	X	X		X	X	X	X
SCITY	School city	X		C6	X	X		X	X	X	X
SCNTY	School county	X		C6/DP?	X	X		X	X	X	X
SSTAT	School state	X		C6	X	X		X	X	X	X
SZIP	School zip	X		C6	X	X		X	X	X	X
SXSTR	School cross street	X		C6/DP?	X	X		X	X	X	X
SLAND	School landmark	X		C6/DP?	X	X		X	X	X	X
SMODE	school Mode	X		C7	X	X		X	X	X	X
TYPDY	Travel day reflects typical travel		X	E3						X	X
O_TYPDY	Travel day reflects typical travel, [typdy=2]		X	E3_FU						X	X
TYPPL	All events planned?		X	E4						X	X
O_TYPPL	All events planned? [typpl=2]		X	E4_FU						X	X
TYPWD	Was this a typical work day for you?		X	E5						X	X
O_TYPWD	Was this a typical work day for you?		X	E5_FU						X	X
TYPSD	Was this a typical school day for you?		X	E6						X	X
O_TYPSD	Was this a typical school day for you?		X	E6_FU						X	X
CMPLG	Completed logs		X	T1			X				
NOGO	No trips		X	T20	X	X		X	X	X	X

Field	Description	Recruit	Retrieve	Q#/source	Current CATS	Extend CATS	Planning Info	4Step +DAP	Tour	AB	AB+LU
O_NOGO	No trips, other		X	T20_FU	X	X		X	X	X	X
PROXITY interview			X	E1			X	X	X	X	X
<b>Additions:</b>											
NONMOB	Reasons for non-mobile person day		X	E101			X	X	X	X	X
TRANPASS	Possession of a transit pass	X						X	X	X	X
TRANSPOND	Possession of transponder / toll (E-Z) pass	X						X	X	X	X

## Place Table Trip Data

Field	Description	Recruit	Retrieve	Q#/source	Current CATS	Extend CATS	Planning Info	4Step +DAP	Tour	AB	AB+LU
SAMPN	Sample Number (unique identifier)		X	DP	X	X		X	X	X	X
PERNO	Person Number (unique identifier within household)		X	DP	X	X		X	X	X	X
DAYNO	Day Number		X	DP			X	X	X	X	X
PLANO	Place Number		X	DP_T3	X	X		X	X	X	X
LOCNO	Location Reference Number		X		X	X		X	X	X	X
PTYPE	Place Type		X	T4	X	X		X	X	X	X
PLCHW	LONG: Location of this place (if NOT PROXY, WORKS =1 & PTYPE >4)		X	L1					X	X	X
O_PLCHW	Other location of this place (if, PLCHW=7)		X	L1_FU					X	X	X
VISIT	LONG: How often have you visited this place? (if NOT PROXY & PTYPE > 4)		X	L2						X	X
O_VISIT	How often have you visited this place, other? (if, VISIT = 7)		X	L2_FU						X	X
TPURP	Primary trip purpose		X	T14	X	X		X	X	X	X
O_TPURP	Other primary trip purpose (if TPURP=12 or 97)		X	T14_FU	X	X		X	X	X	X
TPUR2	Other activities		X	T15		X		X	X	X	X
O_TPUR2	Other activities, Other (if TPUR2 = 12 or 97)		X	T15_FU		X		X	X	X	X
REGAC1	LONG: Is this place where you regularly do this activity?		X	L3a						X	X
REGAC2	LONG: Is this place a location you chose for convenience?		X	L3b						X	X
O_REGAC	Why did you choose this place? (if REGAC1=2 & REGAC2=2)		X	L3c						X	X
EVMOD	LONG: Other types of modes used to travel to this place		X	L4					X	X	X
WMNRS	LONG: Main reason for not using that mode (or modes) this time (if EVMOD > 1)		X	L5					X	X	X
O_WMNRS	Main reason for not using that mode (or modes) this time, Other (if WMNRS = 7)		X	L5_FU					X	X	
MODE	Mode of the trip		X	T8	X	X		X	X	X	X



Field	Description	Recruit	Retrieve	Q#/source	Current CATS	Extend CATS	Planning Info	4Step +DAP	Tour	AB	AB+LU
O_MODE	Mode of the trip, Other (if MODE = 97)		X	T8_FU	X	X		X	X	X	X
TOTTR	Number of people in travel group (including respondent)		X	T9		X		X	X	X	X
HHMEM	Number of household members on trip (if, TOTTR>1)		X	T10		X		X	X	X	X
PERTP	Person Number on trip (if HHMEM>0)		X	T11		X		X	X	X	X
NONHH	Number of Non-Household members on trip		X	DP_T12		X		X	X	X	X
VEHNO	Vehicle Number of the vehicle used for the trip		X	A1		X		X	X	X	X
DYGOV	Did you get out of your vehicle?		X	A2	X	X		X	X	X	X
PRKTY	LONG: Location of parking the vehicle		X	A3	X	X		X	X	X	X
O_PRKTY	Other location of parking the vehicle (if PRKTY=7)		X	A3_FU	X	X		X	X	X	X
PAYPK	LONG: Pay to park?		X	A4	X	X		X	X	X	X
PKAMT	LONG: Amount paid to park		X	A5	X	X		X	X	X	X
PKBAS	LONG: Amount paid to park, units		X		X	X		X	X	X	X
TRANSIT	Number of buses of trains used to make the trip		X	R1	X	X		X	X	X	X
TBUS	Type of transit used		X	R2&R11	X	X		X	X	X	X
BOARD	Where did you board MODE?		X	R3&R12	X	X		X	X	X	X
TBOARD	What time did you board MODE?		X	R4&R13	X	X		X	X	X	X
ROUTE	What was the route/line?		X	R5&R14	X	X		X	X	X	X
BMODE	Mode used to board MODE		X	R6&R15	X	X		X	X	X	X
O_BMODE	Other mode used to board MODE (if BMODE=7)		X	R6&R15_FU	X	X		X	X	X	X
IGEX1	Is it exactly at station/stop (if BMODE = 3 or 4)		X	R6&R15	X	X		X	X	X	X
INPN1	Place name (if BMODE = 3 or 4)		X	R6&R15	X	X		X	X	X	X
IGXS1	Cross-streets (if BMODE = 3 or 4)		X	R6&R15	X	X		X	X	X	X
IGCT1	City (if BMODE = 3 or 4)		X	R6&R15	X	X		X	X	X	X
DISTN	Distance walked/biked to get to bus or train (if BMODE = 1 or 2)		X	R7&R16	X	X		X	X	X	X
DISTNUN	Distance walked/biked to get to bus or train, units (if BMODE = 1 or 2)		X	R7&R16	X	X		X	X	X	X

Field	Description	Recruit	Retrieve	Q#/source	Current CATS	Extend CATS	Planning Info	4Step +DAP	Tour	AB	AB+LU
O_DISTNU	Other units for distance walked/biked to get to bus or train		X	R7&R16_FU	X	X		X	X	X	X
FARE	Fare paid for the trip		X	R19	X	X		X	X	X	X
DMODE	Mode used to reach destination after getting of bus/train		X	R9&R17	X	X		X	X	X	X
O_DMODE	Other mode used to board DODE (if DMODE=7)		X	R9&R17_FU	X	X		X	X	X	X
EGPN	Stop that you got off				X	X		X	X	X	X
O_EGPN	Stop you got off, Other (if EGPN=9997)				X	X		X	X	X	X
EGNA	Place name (if DMODE = 3 or 4)				X	X		X	X	X	X
EGXS	Cross-streets (if DMODE = 3 or 4)				X	X		X	X	X	X
EGCT	City (if DMODE = 3 or 4)				X	X		X	X	X	X
DDISTN	Distance walked/biked to get to destination (if DMODE = 1 or 2)		X	R10&R18	X	X		X	X	X	X
DDISTNU	Distance walked/biked to get to destination, units (if DMODE = 1 or 2)		X	R10&R18	X	X		X	X	X	X
O_DDISTN	Other units for distance walked/biked to get to destination		X	R10&r18_FU	X	X		X	X	X	X
CRAVL	Availability of an automobile when you chose to make this trip by bus or train		X	R20	X	X		X	X	X	X
ARR_HR	Arrival hour		X	T6	X	X		X	X	X	X
ARR_MIN	Arrival minute		X	T6	X	X		X	X	X	X
DEP_HR	Departure hour		X	T18	X	X		X	X	X	X
DEP_MIN	Departure minute		X	T18	X	X		X	X	X	X
ACTDUR	Activity Duration		X	DP	X	X		X	X	X	X
TRPDUR	Trip Duration		X	DP_T7	X	X		X	X	X	X
<b>Additions:</b>											
FIRSTLOC	If first location of the day is not home		X	T101	X	X		X	X	X	X
LASTLOC	If last location of the day is not home		X	T101	X	X		X	X	X	X
PARKDIST	Distance from parking to destination		X	A101	X	X		X	X	X	X
PARKSRCH	Parking search time		X	A 101	X	X		X	X	X	X
PRIM	Primary destination or stop on the way		X	A102		X		X	X	X	X
TOLL	Toll paid / toll facility		X			X		X	X	X	X

## Vehicle Table Data

Field	Description	Recruit	Retrieve	Q#/source	Current CATS	Extend CATS	Planning Info	4Step +DAP	Tour	AB	AB+LU
SAMPN	Sample Number (unique identifier)	X		DP	X	X		X	X	X	X
VEHNO	Vehicle Number (unique identifier within household)	X		DP		X		X	X	X	X
MAKE	Vehicle Make	X		V2			X	X	X	X	X
MODEL	Vehicle Model	X		V3			X	X	X	X	X
YEAR	Vehicle Year	X		V4			X	X	X	X	X
VEHUUSED	Vehicle Used on Travel Day (1=yes)		X	V1	X	X		X	X	X	X



# STATED PREFERENCE RECOMMENDATIONS

---

At this stage of the design process, it is useful to provide recommendations concerning:

- Which behavioral topics are best to include
- What choice context and variables should be included for each one
- How each one can best be integrated with the main RP survey

The work scope mentions several possible stated preference (SP) topic areas:

- congestion pricing
- impact of transportation infrastructure and land use on travel choices
- vehicle ownership and use
- residential location choice
- impacts of telecommunications technology on travel choices
- parking location choice
- introduction of new modes (e.g. transit potential market study)

Although vehicle ownership and use is certainly important, it requires quite an involved effort to offer realistic choice scenarios in terms of the attributes of vehicles on the market, future vehicle technology, etc. There are groups that specialize in designing such surveys, including Argonne Labs in Chicago, so it would not be a good use of resources to try to duplicate those efforts here.

The impacts of telecommunications on travel choices would seem very difficult to frame in a stated preference exercise, as we do not yet have a good background understanding of the issues, and because the technology is changing so fast that any scenarios that focus on the current familiar telecommunications options are not likely to be useful for forecasting. This area seems more suitable for exploratory research than for quantitative SP research.

Residential location choice is an important topic that necessarily brings in many non-transportation aspects of the real estate market. Several SP studies have focused on this type of choice in recent years, including ones linked with household travel surveys in Portland and Atlanta. It may be telling that the data from those two studies has never been used in any meaningful way. Before undertaking an SP study in this topic, it is probably best to have a specific land use modeling approach and framework in mind, along with specific questions that need to be answered.

Many recent SP studies have been done to analyze the possible introduction of new modes, and this is a very appropriate topic if there is policy interest in introducing new types of modes in new areas. Because the Chicago area already has RP data for just about any urban mode that could be conceived, it may be more useful to look at mode choice in the context of congestion pricing and/or infrastructure and land use policies.

Our budget assumes the development of three stated preference topics. These will be administered to up to 1,000 households, based on the household's demographic and travel behavior characteristics. The SP surveys will be personalized to the respondent's reported travel and administered at the end of each data collection wave. The three SP topics that we recommend from the preceding list are:

## CONGESTION PRICING

Although many SP studies have been done recently to look specifically at measuring value of time savings in HOT lane route choice contexts, it would be more useful to include a more comprehensive SP experiment that can also look at time-of-day pricing and cordon pricing, and can also consider effects on time of day choice, mode choice, and perhaps destination choice. A good starting point would be an SP study that was done in recent years in the Netherlands and then repeated in the UK and also adapted for use in the Dallas area (Chandra?). This is a customized SP approach that uses RP diary data, selects a specific trip of interest, and then presents the respondent with a series of choice scenarios that are realistic for that trip. Depending on the context, options would be:

- Pay a toll
- Use a slower route to avoid the toll
- Travel earlier to avoid the toll
- Travel later to avoid the toll
- Change to transit or walk or carpool to avoid the toll

The choice would be mainly a function of:

- Price
- Expected travel time
- Reliability / frequency of delays
- Definition of the peak/non-peak pricing periods

For commute tours, the scenarios should consider both the trip to work and trip back from work, because changes in one often require changes in the other as well.

## PARKING LOCATION

Although parking is probably the most effective single policy lever in most cities, there has been very little modeling of parking choice, mainly because most regional models do not operate at a fine enough spatial level to represent parking alternatives. With the advent of microsimulation models and more detailed GIS and data inventory systems, it will be more and more possible to include parking choice as an aspect of behavior in forecasting (e.g. as an extension of route choice in network assignment models). We will need to have behavioral parameters for those models, and household survey data is typically not collected at the level of detail to allow RP estimation (although it could be). Parking options to be considered include:

- Paid garage parking
- Paid lot parking
- Paid on-street parking
- Free on-street parking

The key variables to include are:

- Parking price, as a function of duration
- Expected time to reach the facility and find a parking space
- Search time variability/ frequency of long search times
- Walk time to the destination

The scenarios are geared to specific RP diary trips, so that the parking alternatives will be realistic and relevant for different areas. For commuters, the alternatives could be extended to include a transit option, and the scenarios could be extended to include incentives such as an employee parking cash-out program.

## **IMPACT OF TRANSIT SERVICE QUALITY AND ESTIMATION OF POTENTIAL FOR MODAL SHIFT TO TRANSIT**

### ***Purpose of the Survey***

The purpose of the survey is three-fold:

- Support a better estimation of mode choice model, especially on the transit side
- Support a better calibration of transit assignment and skimming procedures, especially for multimodal networks
- Provide transportation planners with a better understanding and measurement instruments for transit service quality and impact of possible improvements / policies

It should be mentioned that similar to road pricing, transit preferences cannot be restored in full from the RP survey even in urban areas like Chicago that are characterized by a significant share of transit and variety of transit modes. We normally do not observe enough variation in transit service for each travel / population segment as well as cannot ask too many questions about transit service quality and impact on the decision to use or not to use transit. For this reason, it frequently happens in practice that estimation of a mode choice model on RP data brings illogical values of coefficients for travel time and cost (and modelers normally have to restrict them).

### ***Variables and Estimation of Potential Impacts***

Impact of the following variables will be explored and estimated:

- Transit mode preferences (biases) for different travel and population segments:
  - By travel distance
  - By travel purpose
  - By travel party (alone, with children, with adults)
  - By trip frequency
  - By person age / mobility
- Perception of different travel time components:
  - in-vehicle time,
  - walk time and pedestrian friendliness,
  - wait time,
  - auto access,
  - # transfers.
- Access / egress options (walk, feeder line, drive, auto passenger) and transit route proportions

- Transit service reliability / schedule adherence
- Transit frequency for outbound and inbound trips
- Comfort / convenience in bus/train (usable time, air conditioning)
- Comfort / convenience at stations / additional activities / exposure to weather conditions
- Providing information
- Probability of having a seat
- Perception of personal safety and allowing children to use transit
- Availability thresholds (at what point travelers consider transit as not available):
  - Frequency threshold
  - Age
  - Activity type (shopping with bags, well-dressed, etc)
  - Travel time surplus versus alternative modes
- Quality and perception of competing modes (drive alone, shared ride, non-motorized, school bus, etc) relative to the transit service
- Sensitivity to transit fares:
  - Base fare structure
  - Personal discounts (children, students, seniors, etc)
  - Bulk discounts / monthly pass
  - Subsidies (pre-tax transit checks)
- Perception of auto captivity for commuting and/or other trips and car ownership decisions

### ***Impact of transportation infrastructure and land use***

With the advent of more detailed and disaggregate travel demand models, we also will have the opportunity of capturing more accurately the factors that influence “pedestrian friendliness” and “transit friendliness”. The types of factors that might be expected to influence this include:

- Mixed uses: e.g. the balance between stores and restaurants and other service/retail establishments with homes and offices.
- Densities: The absolute number of such locations
- Sidewalks and intersections: What the street pattern looks like and how conducive it is to walking. (Sidewalk and street width could also be used here.)
- Transit stop densities and locations

The types of trips that scenarios could be based around include:

- Commute trips where transit is a realistic option to the auto
- Midday trips made from the office
- Trips from home made by city residents (i.e. walking is a conceivable option)

For the latter two types of trips, the choice scenario could be one of both mode and destination choice: drive to a typical retail area, or else walk to something closer if the local infrastructure were more conducive to walking. Out of the conceptual SP topics, this one has been studied least often in the past, so it would require the most imagination and pre-testing in the design stage.